vol. xv., December, 1918), Carl Hartley, T. C. Merrill, and Arthur S. Rhoads have made a valuable contribution to the study of forest pathology. Damping-off is the most serious disease of very young seedling conifers, and several types of the disease are described. In addition to the well-known *Pythium debaryanum* and *Corticium vagum*, species of Fusarium and *Botrytis cinerea* have been isolated from affected seedlings, and are believed to be able to cause the disease. Artificial cultures of the fungus indicated a marked difference in virulence between different strains, which bears little or no relation to the host from which the strain was isolated. Thus strains from spruce and sugar-beet respectively proved more virulent in inoculations on pine seedlings than did any of the strains originally isolated from pine. Losses often wrongly attributed to poor seed are caused by the fungus killing the seed or the seedling before it appears above soil; and some of the damping-off fungi may continue to kill the roots of seedlings after they develop rigid stems, so that the plant does not fall over. The latter type of trouble is sometimes confused with damage caused by excessive heat or dryness of soil.

In the Memoirs of the Department of Agriculture in India (Botanical Series, vol. ix., November, 1918) W. McRae gives a detailed account of a new fungus disease (*Phytophthora meadii*) of a rubber plant, *Hevea brasiliensis*. This species of Hevea is now being extensively grown in the south-western region of the Indian peninsula. The most striking symptoms of the disease are the rotting of the fruit and the wilting and abnormal shedding of the leaves. Mr. McRae describes the external symptoms and the microscopic characters of the affected tissues, and also his experiments on inoculation; the structure and the life-history of the fungus are also fully described. The resting spores of the fungus are found in the fruits of the plant, and as the fruits are therefore the chief means of propagating the disease, the possibility is suggested of the destruction of the flowers in order to prevent the formation of fruit. This might be done by mechanically removing the flowers or by spraying them with a chemical that would kill them, but up to the present neither of these means has been found practicable.

THE FISHERIES AND THE INTERNATIONAL COUNCIL.[1]

I.

IN former communications[2] it was shown how insignificant is the influence of man in affecting the plants, such as seaweeds and diatoms, abounding in the sea, and how little he can influence the lower marine animals, from microscopic elementary forms, through sponges, zoophytes, starfishes, annelids, shell-fishes, and cuttlefishes, up to fishes. It was further demonstrated in 1898 that the closure of the experimental areas (Forth, St. Andrews Bay, and Aberdeen Bay) had not affected the food-fishes, either as regards increase or diminution in numbers or size. Now it may be asked: Where have the melancholy anticipations of the pessimists been demonstrated; where has the serious diminution of any food-fish occurred; and where have the principles enunciated in "The Resources of the Sea" been traversed by the International Fisheries Council, the most extensive, and certainly the most expensive, combination of fisheries authorities the world has seen, which owed its existence to opinions (viz. those of the impoverishment theory) diametrically opposed to those of "The Resources of the Sea"?

In the lectures at the Royal Institution in 1907 the uncertainty of the Fishery Board for Scotland in connection with the further closures than those remitted to it was pointed out, for it had oscillated between an increase and a diminution of fishes in the experimental areas, and its own statistics in subsequent years proved the safety of the Scottish fisheries, which have been dealt with elsewhere up to 1912, when they were reviewed at the Dundee meeting of the British Association. No voice at that meeting was raised in support of the impoverishment of the sea, though Dr. Petersen, Dr. Mortensen, and Prof. Jungarsen from Copenhagen, and others specially interested were present. Indeed, Prof. Hulrecht, of Utrecht, also present, strongly supported "The Resources of the Sea," and stated that Prof. Huxley held the same views. Since 1912 similar prosperous records have been annually published by the Scottish Board up to 1913, the last year unaffected by the war, when the climax was reached, the value of the catch of fishes being no less than 3,997,717*l*. (or only 2283*l*. less than four millions), the highest value yet attained in the fisheries of Scotland, though the catch of herrings that year had been 758,756 cwt. below that of the previous one.

The same cause for satisfaction exists after a perusal of the captures, year by year, in such a bay as St. Andrews, where they have been under observation for at least half a century, and in which the pulse of the North Sea is felt day by day and month by month each season, with perhaps varying regularity, producing its fishes in greater or less abundance.

Before going into the results of the costly international scheme, it may be well to recall the remit made to the Council of that body. It was, in the first place, to benefit the British fisheries, to clear up the discrepancies between "The Resources of the Sea" and "The Impoverishment of the Sea"—in the words of Prof. Garstang: "It was the problem of all problems whether the conclusions in this book ['The Resources of the Sea'] were well or inadequately founded." The Council had also to ascertain "whether the quantity and consumption of fish taken from the North Sea and neighbourhood are in proper proportion to the production occurring under the prevailing natural conditions, and whether any disproportion between production and consumption arises from a local over-fishing or from an injudicious employment of the fishing apparatus at present in use." The flat-fish grounds were also to be investigated; annual results published; discoveries of practical importance to the fisheries made, such as "discovering the limit to which fishing grounds can be depleted without undergoing serious injury"; and, finally, recommendations for international action proposed. This formidable remit was, moreover, burdened by a heavy load of hydrographical, physical, chemical, and meteorological observations. Yet some members of the Council guaranteed results for international action within two years—a fact which demonstrates how little the situation was understood.

The earlier work of the International Council was dealt with on a former occasion, and since then the following gives a brief note of its labours:—

Reports on the quantitative distribution of the eggs and larvæ of the cod tribe and of the sardine and anchovy in the North Sea have been given by Hoek; on young salmon by Arwidsson; on the cod by Hoek; on the herring by Hjort and Lea; on the eel by Schneider; and on the mackerel by Nilsson, all containing additions to our knowledge, though they do not bear on the main question submitted to the International Council for solution. The Council was likewise concerned about the capture of full-sized herrings by the ordinary trawl in daylight. A useful summary of the present knowledge of the mackerel fishery in Denmark, Sweden, Norway, Holland, Germany, Scotland, England, Ireland, France, Southern Europe, and the North-West Atlantic came from Ehrenbaum, the usual variations occurring throughout. This variability was further emphasised by Dr. Hugh Smith, of the United States, in the decline of the fishery there from 500,000 barrels in 1885 to 3000 in 1910; yet it had not been proved that the fishes had migrated to other grounds, such as western Europe, or had been decimated by the purse-seines.[3] Moreover a similar experience had been met with in Norway.

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[1] From a lecture given in Aberdeen on March 4 by Prof. McIntosh, F.R.S.

[2] NATURE, vol. lxxvi., p. 301, 1907.

As the oft-repeated statements concerning the diminution of the flat-fishes (Pleuronectids) had attracted public notice, the Council devoted a large amount of attention to this group. Thus Ehrenbaum, in two papers, took in hand the early stages from the eggs onwards, and their occurrence according to the months of the year; whilst Johansen discussed them in relation to the North Sea generally, a certain amount of duplication taking place. Ehrenbaum's first paper, perhaps, was the less important, for the subject had in many respects been dealt with previously. In his second paper he groups the pelagic eggs according to the presence or absence of an oil-globule, and appends two plates, the figures on which had, for the most part, been published by other authors. Hefford describes the proportional distribution of plaice in the North Sea, males slightly preponderating in small plaice, whereas in the larger forms females are in the majority, yet in the breeding season in the south (December to February) the catch of males by trawlers greatly exceeds that of females. Masterman's three reports on the late stages of the flat-fishes give much important information and noteworthy recommendations, but there is no indication of a serious diminution of any form. On the other hand, Johansen considers that the average weight of plaice in the Danish region of the North Sea has distinctly decreased since 1888—a different finding from a much longer experience in St. Andrews Bay. Heincke (1913) is of opinion that the Danish and German investigations show a deterioration of the stock of plaice, and that, apart from over-fishing, the destruction of small plaice is in itself sufficient to render protective measures desirable. He has not, however, proved that the small plaice are reduced in number—a vital point—and this though he states that 300,000,000 are annually destroyed, irrespective of the capture of plaice from two to thirty years old for sale, only 10 per cent. of which have produced eggs. He therefore proposes the sole legislative measures which the sixteen years' costly labours of the Council have produced, viz.: (1) Protection of the young plaice; (2) closed areas and seasons; and (3) a size-limit. The revival of the old size-limit is interesting, but its application is more than doubtful, especially when Heincke cannot prove definitely that plaice have diminished. Redeke concludes with an account of the local forms of plaice in Danish waters.

The Council has, indeed, expended a great amount of labour on the plaice, and it is no lack of sympathy with the various authors of the memoirs which prompts the statement that no trustworthy conclusion as to its serious diminution can be drawn from them, and they are in some respects duplicated. No author can definitely assert that the plaice is on the road to extinction. It is said that evidence to the effect that the diminution of the plaice "was already made clear to the House of Commons in 1893, and that all authorities are agreed that this fish shows serious diminution." But the statistics of the Fishery Board on which I and others relied in 1893 were found by a more stringent examination to be in need of modification, and in the history of the fisheries the plaice, as already mentioned, has of old been the subject of pessimistic views, just as those accounting for the absence of large plaice in inshore shallow waters—by over-fishing—rest on a misapprehension of the life-history of the species. The conjectures that only 10 per cent. of the captured adults have produced eggs, and that the removal of 20 to 40 per cent. from the North Sea annually is too great a loss to be compensated by natural means, are not the clear facts demanded by science and the State. Plaice have been taken from the North Sea from time immemorial, and yet are distributed to-day over its entire area, whilst their tiny young swarm on every suitable sandy or muddy beach. Though it is to be regretted that the destruction of the small plaice crowding on the sandy flats of the Continental shores still goes on, yet there is no marked diminution in their numbers. Heincke's suggestions for the protection of the young are of doubtful practical utility; besides, as Masterman says, why confine legislation to the plaice when the other flat-fishes are likewise supposed to be in need, and the round-fishes have an equal claim? Perhaps the pressure brought to bear on the Council to produce, after its lengthened labours, something tangible in the way of legislative recommendations may have had some connection with this step.

In "The Analysis and Review of the English Plaice-marking Experiments," published in 1916 by the Board of Agriculture and Fisheries, less ambitious views were promulgated, though it was thought that the transplantation of plaice on a commercial scale might yield a profit. Many important papers have been issued by the English Board, such as Masterman's report on the plaice fisheries of the North Sea, and the age, growth, and sexual maturity of this fish; Todd on the food of the plaice; Buchanan Wollaston on the spawning grounds of the plaice; Wallace on the age and growth-rate of the plaice, on the ear-bones, and on the size and age of the plaice at maturity; whilst others by Booley, Lee and Atkinson, Garstang, Bygrave, and Matthews show the scientific zeal of the Board's staff. The excellent work in marine zoology and in the fisheries which for more than thirty years has been carried on by the Marine Biological Association at Plymouth likewise speaks for itself.

The work of the northern section, as undertaken by the Fishery Board for Scotland, has also been reviewed up to 1907 in the second lecture at the Royal Institution. It was shown that, as a result of Hjort's discovery of vast swarms of young Gadoids from Jan Meyen southwards, there was little need for surprise at the immense hordes of young haddocks which, as last year, swarmed all along the east coast of Scotland, and as little need for doubting the resources of Nature in the sea.

Johs. Schmidt gives valuable information on the young stages of the cod tribe, of the lings, halibut, long rough dab, and the torsk, and, along with Petersen, describes the spawning ground of the eel in mid-Atlantic. H. M. Kyle produces two papers on the literature of the ten principal food-fishes of the North Sea and a catalogue of the fishes of northern Europe. Jensen (Norway) writes on the ear-bones of fishes from the bottom of the deep polar sea, and shows that cod may frequent the upper regions of the water and thus be overlooked. Johansen describes the history of the post-larval eel, and Petersen writes on the larval and post-larval stages of the ling, flat-fishes, eel, and on the fisheries of the Cattegat and Sweden. On the whole, the papers on the young stages of the food-fishes (with the exception of Schmidt and Petersen on the eel) do not show much that is novel, for most of these had long before been worked out from the egg to a recognisable stage in Scotland.

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[3] This fishery has now largely improved.

The third report of the northern section consists of a series of statistical tables of the round fishes from the Aberdeen trawl fishery, 1901–6, and a report of the fluctuations in the market price of fishes (Prof. D'Arcy Thompson). No conclusion is arrived at in regard to abundance or scarcity. The fourth report (1906–8) states that recent work has greatly added to our knowledge, "though without bringing us within reach of a clear statement and comprehension of the whole case," and this though results were guaranteed within two years. The report includes hydrographical investigations in the North Sea and Faröe-Shetland Channel, temperatures of the surface waters of the North Sea, salinity of the North Sea, and experiments with drift-bottles. The fifth report contains observations on the plaice caught by the *Goldseeker*, supplemented by statistics from the Aberdeen market, by the same author. It is stated that large plaice have diminished by two-thirds between 1905 and 1911, whilst the landings of extra small plaice (8 in.) have increased threefold. No explanation is given as to whether the ship worked on adult plaice grounds, or whether those in the fish market represented with any degree of trustworthiness the corresponding work of the earlier period; nor is it explained that the smaller forms are now saleable, whereas formerly they were not. In any case, the removal of the larger plaice by intensive fishing is the rule, but the gaps thus made are filled later by the swarms of the smaller. Besides, it is not stated that the search for the large plaice was in the same or similar areas and on the corresponding dates in each period. As already indicated, the wide distribution of the plaice over the North Sea is a safeguard. An able report by Dr. Fulton on the seasonal abundance of the flat-fishes in the North Sea follows. He concludes that turbot and brill are scarcer, halibut more numerous, large witches fewer, small witches less diminished, megrims less numerous, lemon-dabs (the decrease of which twenty years ago was a mainstay of impoverishment) have increased, plaice have decreased, yet off Kinnaird Head, a chief trawling area, small plaice have rather increased, though less so than small lemon-dabs and witches. An interesting and laborious report is given by the same author on the marking of plaice in connection with their migration, growth, and other features. The adult plaice seemed to travel further than the immature, and often against the current from the north, so that he was inclined to connect this with their reproduction, the eggs and larvæ being thus carried southwards; but such may be capable of other interpretations. At any rate, large plaice occur all along the eastern deep waters, and produce eggs and larvæ which pass shorewards there. Other papers are on egg-production of numerous fishes by Miss A. Mitchell, statistics of trawled fishes landed at Aberdeen, and a report on hydrographical investigations (1913). The fishery statistics of the world for 1911 and 1912 were given by Prof. D'Arcy Thompson in 1917, though the relation of this compilation to the task set before the International Council is not evident. The main fact is the prominence of Great Britain amongst the twelve countries selected. The preponderance of the total catch of fishes, moreover, in the North Sea is noteworthy, and bears out H. M. Kyle's view that there has been no diminution in the yield of the North Sea between 1907 and 1912. It would have been interesting to compare these with the fisheries of the United States and of the great British Colonies of Canada, Australia, and New Zealand. Other statistical papers, such as those on the Aberdeen trawl industry, by the same author, and by Helland-Hansen on the cod and haddock, need only be mentioned. They do not affect the general question.

The work of the trained scientific staff of the Fishery Board for Scotland, again, and independently of the International Council, has for many years been worthy of all praise. The researches of Dr. Fulton on the plaice and other flat-fishes, on the rate of growth and the food of fishes, their migrations, distribution, fecundity, ovarian eggs, and spawning, are both numerous and important. His reports on trawling, line fishing, herring fishing, and on the hatchery at Nigg still further add to our knowledge. The able work of Dr. H. C. Williamson is also equally creditable to the Board, and ranges over the various food-fishes, adult and young, edible crabs and shell-fishes, as well as includes interesting experiments on the effect of cold in connection with the transportation of fishes' eggs to distant regions, such as Australia. Dr. Thomas Scott ably took in hand the floating fauna, crustacean and annelidan parasites of fishes, the food of marine fishes, and the fauna of fresh-water lochs. Mr. Harold Dannerig managed the hatchery at Dunbar, and for a few years that at Nigg, until he left for an important fishery post in New South Wales; but, unfortunately, this trained fisheries worker perished with the fishery research ship of the Commonwealth. Besides these, the talented George Brook, Prof. Milroy, of Belfast, Dr. H. M. Kyle, J. T. Cunningham, Dr. A. G. Anderson, Mr. E. W. Shann, and Dr. Bowman have all contributed to our knowledge of the fisheries.

In addition to the international work, the Danish Government carried out, by means of its vessel *Thor*, various independent observations. Thus Johansen (1907) marked numerous plaice, and found that growth was most rapid up to the third year, but on approaching maturity it was slower. He thought adult plaice sought the shallow water in spring and autumn (which has not been verified as yet in Britain), and that their rate of progress was from two to six miles a day. Johannes Schmidt, again, marked many cod in Icelandic waters, where they spawn chiefly off the south and south-west coasts in warmer water, for a polar current keeps the north and north-east shores cold through the year. In summer a branch of the warm current moves eastwards along the north coast, and he thinks it is important for young fish-life, since the young swarm in the fjords of the north and north-east, yet they pass the winter there, notwithstanding the temperature. He was of opinion that the mature plaice, which he also marked, migrated to reach warmer water for spawning, but he was uncertain of this in regard to the cod. He concluded by supposing that at the spawning period fishes generally require definite conditions of temperature and depth, whilst at other times they are indifferent to these. The same author describes the larval stages of various fishes, as also did C. J. Petersen. Semundsen (1913), from marking experiments, thought that both plaice and cod kept to Icelandic waters. Changes in the specific gravity of the floating eggs are noted by Jacobson and Johansen (1909); the latter also contributed several papers on the plaice, such as variations in the frequency of young plaice in Danish waters (1908). He could not say definitely that a low salinity of surface water caused a deficiency of young plaice in 1004, and is not sure but that a low temperature might be prejudicial to eggs and young. Papers of outstanding merit are contributed by Johs. Schmidt on the metamorphosis and distribution of the larvæ of the eel on the occurrence of young eels (Leptocephali) in the Atlantic west of Europe, and on the distribution and classification of fresh-water eels in the Atlantic; and this able author's experiences range to the marking of turtles in the West Indies. He also furnished an account of the European, American, and Japanese eels. Finding no racial differences in the common eel, he selected the viviparous blenny to illustrate this feature, those in the inner waters of a fjord having a reduced number of vertebræ, and the number of the rays in the breast-fin being increased from the mouth to the inner waters of the fjord. Kramp, again, reported on the eggs and larvæ of common fishes collected by the *Thor* in the Belt Sea. Wingo (1915) regards locality as a factor in determining the value of the rings on the scales of the cod, and is of opinion that there is no great distinction between summer and winter rings, whether the examples come from Danish or Icelandic seas. Struberg (1916), by marking experiments at the Faröes, found that the cod at the end of the first year were 16 cm. (about 6½ in.) long, at the end of the second year 30–35 cm. (about 12–14 in.), at the end of the third year 15 cm. (6 in.) longer, and the weight doubled and quadrupled; at the end of the fifth year an increment of only 5–6 cm. took place. The growth in all was distinctly retarded between October and January, but this varied according to locality. The cod remain in the neighbourhood, undergo no great migration, and reach maturity at the fourth year.

This work of the Danes is an example to the theoretical workers in other countries, since the zoologists were personally in touch with the sea and searched Nature for themselves; and it would appear that, by the skilful adjustment of the resources of a single nation, more satisfactory advances might be made than by any other means. Even international co-operation has its limits.

(*To be continued.*)

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Bristol.—With the concurrence of the Society of Merchant Venturers, the council has appointed Major Andrew Robertson to the vacant chair of mechanical engineering. Prof. Robertson was demonstrator in engineering in the University of Manchester from 1908 to 1912; Vulcan research fellow, 1912–15; lieutenant in the R.N.V.R., 1915, and for some time has been head of the mechanical testing laboratory for the R.A.F. at Farnborough. The present occupant of the chair, Prof. J. Munro, has been granted the title of emeritus professor in mechanical engineering.

Glasgow.—The following were among the degrees conferred on June 25:—*Doctor of Laws* (*LL.D.*): The Very Rev. Principal Sir John Herkless, St. Andrews; Prof. Magnus Maclean, the Royal Technical College, Glasgow; and H. F. Stockdale, director of the Royal Technical College, Glasgow. *Doctor of Philosophy* (*D.Phil.*): J. W. Scott—thesis, "Recent Philosophy and Recent Social Movements." *Doctor of Science* (*D.Sc.*): W. M. Alexander—thesis, "A Research in Egyptology: The Ancient Egyptian Canals between the Mediterranean and the Red Sea, their Problems for the Sciences of Geology, Geography, Engineering, and History"; J. M. Campbell—thesis, "Laterite: Its Origin, Structure, and Minerals"; W. J. Goudie—thesis, "Steam Turbines (Text-book for Engineering Students)," with other papers; I. M. Heilbron—thesis, "A Contribution to the Study of Semi-carbazones: Their Reactions and Spectrographic Examination," with other papers; R. G. A. Holmes—thesis, "Design and Construction of H.M.S. *Argus*"; and H. G. Wigg—thesis, "The Balancing of Rotating Bodies."

London.—Mr. Thomas Baillie Johnston has been appointed the first incumbent of the University chair of anatomy tenable at Guy's Hospital Medical School. Mr. Johnston received his medical training at the University of Edinburgh, graduating M.B., Ch.B., with First Class honours. In 1907 he was appointed demonstrator, and in 1911 lecturer, in anatomy at Edinburgh University. Since 1914 he has been lecturer on anatomy at University College, London, and has also acted as superintendent of dissections to the Conjoint Board.

Dr. Alfred Joseph Clark has been appointed, as from September 1, 1919, to the University chair of pharmacology tenable at University College. Dr. Clark was educated at King's College, Cambridge, and at St. Bartholomew's Hospital; was demonstrator in pharmacology at King's College, 1911–12; assistant in pharmacology at University College, 1912–13; and lecturer in pharmacology at Guy's Hospital, 1913–14. Since December, 1918, he has been professor of pharmacology in the University of Cape Town.

The following doctorates have been conferred by the Senate:—*D.Sc.* (*Engineering*): Mr. O. S. Sinnatt, an internal student of King's College, for a thesis entitled "Thermo-dynamics of Metal Bars." *D.Sc. in Physics*: Mr. F. L. Hopwood, an external student, for a thesis on acoustics.

The thanks of the Senate have been accorded to Mrs. Row for her donation of 1000*l.* for the department of zoology at King's College in memory of her son, Harold Row, who was lecturer in zoology at the College from 1911–19. The income from this donation is to be devoted to the purposes of a scholarship for the promotion of zoological research, to be called "The Harold Row Scholarship."

The syllabuses for the Intermediate Science Examination for external students were approved as alternative syllabuses for the Higher School Examination, and resolutions were passed regarding the award of the higher school certificates.

Mr. W. Elliott has been appointed principal of the Technical Institute, Rathmines, Dublin, in succession to the late Mr. A. Williamson.

The U.S. General Education Board has, says *Science*, made a grant of 100,000*l.* towards a fund of 400,000*l.* to be raised to endow a graduate school of education for Harvard University. The new fund will be named in honour of Dr. Charles W. Eliot, president emeritus of Harvard University.

Mr. J. B. Robertson, assistant in the chemistry department, University of Edinburgh, has been appointed lecturer in chemistry in the South African School of Mines, Johannesburg. Mr. A. E. Walden, also an assistant in the same department, has been appointed professor of chemistry in the Wilson College, Bombay.

Two scholarships of the value of 150*l.* per annum each, and tenable for three years, will be offered by the Institution of Naval Architects this summer, viz. the Cammell Laird scholarship in naval architecture and the Parsons scholarship in marine engineering. Candidates must be British apprentices in shipyard or marine-engine works, between the ages of nineteen and twenty-five. Entries close on August 11. Full particulars can be obtained from the Secretary, Institution of Naval Architects, 5 Adelphi Terrace, London, W.C.2.

The Gilchrist Trustees offer, through the council of the London (Royal Free Hospital) School of Medicine for Women, a special scholarship tenable at the Medical School by a woman who has served under an organisation directly connected with the war during not less than three years since August, 1914. The